

IODINE-125 MCA AIR MONITOR

GAS & PARTICULATE

Model - FM-9-MCA-2

FEATURES:

- **I-125 GAMMA AIR MONITOR**
- CONTINUOUS REAL-TIME AIR MONITOR
- MULTI-CHANNEL ANALYZER (MCA)
- BUILT IN DATA LOGGER
- INTEGRATED EXPOSURE
- STANDARD FM-9 MODULES
- HIGHLY SENSITIVE
- REAL-TIME ALARMS – AUDIO & VISUAL
- RELAY CONTROL CAN LOCK DOORS, TRIGGER A SIREN OR SEND AN ALERT
- QUICK CHANGE FILTER CARTRIDGE
- REGULATED AIR FLOW
- CAN DRAW AIR FROM HOOD, DUCT, ETC.
- USB & ETHERNET PORTS
- CART-MOUNTED WITH LOCKABLE WHEELS

FM-9 Electronics Modules



Detector

APPLICATION:

The **FM-9-MCA-2** is a continuous real-time I-125 Air Monitor. Monitor room air or stack air effluent for Iodine-125 down to low levels. The **FM-9-MCA-2** can also be used for hood, glove box, or other workplace air. The Multi-Channel Analyzer (MCA) enhances analysis of which nuclides are present.

The **FM-9-MCA-2** assures safety against airborne radioactivity contamination with a real-time constant check. An audio visual user settable alarm and recording capability provides instant access to levels of concern. Integrated exposure information is also provided.

The **FM-9-MCA-2** is a complete system which can be expanded with additional FM-9 Series Modules.

DESCRIPTION:

FM-9-MCA-2 radiation control monitor is a cart-mounted rugged Gamma air monitor with AC Operation. Gamma emitter content is measured using an MCA analyzer with greater than 1,000 channels. The energy range is user settable.

The **TA SMART-PEAK™ Isotope Identification System** detects peaks at very low I-125 Gamma concentration. In the event of high radioactive activity and during system calibration, the isotope identifier function displays the exact radioactive nuclides in the air.

The **FM-9-MCA-2** is a Gamma detector air monitor/controller for simultaneous measurement of Gamma emitting radionuclides. The electronics are a microprocessor with color LCD display. Detector shields are nickel plated for long useful life and easy decontamination.

- User settable to preferred engineering units: DAC, $\mu\text{Ci}/\text{cm}^3$, cps, cpm, etc.



TECHNICAL ASSOCIATES
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DATA ANALYSIS, HARD COPY, DVD, ROM ARCHIVE:

In each peak or area of interest, the net counts are automatically converted to concentration units, of picocuries/liter, using the detector efficiencies automatically measured and stored previously by the FM-9-MCA-2 semi-automatic self-calibration procedure.

The concentration and total activity released and MDA levels are continuously calculated and recorded. The real time information will alert the notification system. All data is save to the hard drive in spreadsheet format.

Historical data is easily displayed on screen and/or printed out on the optional graphics printer in tabular or graphical format, showing quantitative information aw well as trends. Data is recorded frequently so time resolution is excellent. Ethernet and USB ports make it easy to archive and further analyze data.

Continuous, Reliable Data – YES, False Alarms - NO

With multiple layers of protections and redundancy in both the software and the physical act of reporting an alarm, false alarms are prevented. This includes an optional alarm voting system that alarms only if all the data is consistent and conclusive. The data is continuously recorded to allow human interpretation. Each alarm activates fail-safe relays. Relay contacts are available to user.

SYSTEM DESCRIPTION:

The **FM-9-MCA-2** uses a standard charcoal filter in TA's unique quick change, no leak holder to trap any airborne Radio Iodine. The filter is under constant surveillance via a thin window scintillation detector. Air is drawn by a regulated pump through inlet tubing and exhausted via an electronic flow meter through tubing. **Electronic air flow sensor continuously reads into computer calculation for airborne activity resulting in high accuracy of airborne activity rate and total.** Time is continuously recorded. The unit is completely self-contained. Comes with 10 charcoal filter cartridges.

SYSTEM SENSITIVITY:

Sensitivity: I-125

Typical measurement requirements are 1 DAC increase in 8 hours and detection of 0.02 DAC increase in 40 hours, where 1 DAC is taken to be 1140 Bq/m³.

If the average external background is above 800 KeV: Shielding should be increased beyond the standard 1.5" brass or 1" Pb.

NOTE: System can be modified to measure I-131 and PET

SELF TEST FAULT CONDITIONS SUMMARY

The **FM-9-MCA-2** indicates when there is a fault condition. Audible and visual alarms are provided.

FAULT INDICATORS ARE PROVIDED FOR:

- Detector Failure – indicated if no counts are received from the detector
- Low Airflow - indicated if measured sample airflow is below the lower airflow limit.
OPTIONAL: High air flow alarm.
- Filter Change Housing is Open
- Filter Pressure – indicated if there is no differential pressure across the filter.

Typically Due To:

- No Filter Present
- Filter is Broken
- Air Supply is Interrupted



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DIGITAL DISPLAY:

- Airborne Concentration and CPM for Identified Peaks
- Concentration for Unidentified Peaks
- Total/Aggregate Gamma Emitter Concentration
- Average Concentration for the Work Shift or for the 24 hour period, User Settable
- Longer Averages Can Be Displayed
- Engineering Units are User Settable
- Air Flow Rate
- User Settable Current Count Rate Unit, ie: cps vs cpm
- Condition and Alarm Status for Each Monitored Value and Parameter
- Multiple High Resolution Gamma, Each with Zoom-In Capability.
(User can view current spectrum or total spectrum since last filter change.)
- System Menu Allows User Choice for Display or Suppression of Data
Below the Minimum Detectable Amount
- Trending Data and Graphs; Selectable for On-Screen Viewing

SPECIAL FEATURES:

- Total Exposure Since Last Filter Change
- Remote Viewing for Gamma Spectrum & All Measurement Parameters of Current & Logged Data

NON-ALARMING DATA LOGGING

FM-9-MCA-2 Data Logging is sufficient to reconstruct airborne excursions,
& long-term airborne concentration trends.

DATA INCLUDES:

- Date & Time
- CAM ID
- CAM Status
- Minimum Detectable Concentration (DAC) for Fast & Slow Alarms
- Detected Concentration for Fast & Slow Alarms
- Minimum Detectable Exposure (DAC-H)
- Detected Exposure
- Sample Flow Rate
- Total Volume

TIMED DATA:

- Immediate Past (30 minutes) in intervals of seconds
- Regular Day Shift (8 hours) in intervals no longer than 10 minutes
- Intermediate Past (past, month) intervals no longer than 30 minutes
- Long-Term Past (> 1 month, < 2 years) intervals no longer than 4-6 hours

REMOTE VIEWING CAPABILITY:

- View Results of CAM (including Spectrum) from remote locations

FALSE ALARM RATE:

- No more than once per month when TA procedures and correct operation and maintenance are followed.



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SPECIFICATIONS:

Detector: 2.5 inch diameter probe with thin window and 2 inch NaI(Tl) crystal scintillation detector

FM-9 ELECTRONIC MODULES INCLUDE:

- **Power Supply:** MV-5.12.24.
- **Air Flow Monitor:** Low and High Flow Alarms. Air Flow Rate is monitored, displayed (LPM), and logged continuously. This includes Total Air Flow since last filter change.
- **MCA-9:** Multi Channel Analyzer.
- **MCT:** Computer and 17 inch or better Color Monitor.

Pump: Continuous Operation; Muffler and trap included. Low noise <60 dB.

Shielding: 1" to 3" of lead about sample and detector.

Front Panel:

- LED Power Indication Light.
- Low Flow Indicator Light.
- Power ON / OFF Switch.
- Alarm-Mute.
- Integrate.
- Reset.

Recessed or Internal: Discriminator level, high voltage. Other adjustable settings.

Engineering Units:

- User settable to preferred engineering units: DAC, $\mu\text{Ci}/\text{cm}^3$, cps, cpm, etc.
- User can input correct conversion factor and change to any units; DAC, $\mu\text{Ci}/\text{cm}^3$, cps, etc.

Input Sensitivity: Adjustable from less than 1 millivolt

Serial Output: Two way USB standard, Ethernet optional.

Recorder: (21)

- Paperless
- Single Channel or Multiple Channel

Readout: Color 17 inch LCD Monitor: Status, Alarms, Concentration, Total Radiation Values

Remote Reporting: Relays are provided for high level alarms.
Can be used to control remote alarms, door locks, etc.

ALARMS:

Alarm: User settable. 2,000 Hz audio tone with audio "mute" switch
Separate RED LIGHT (360 degrees viewable). 0-100% of full scale.

Alarm Levels: User settable with controlled access.

Alarm Response Time: Fast/Acute Situations: Evaluated every 5 to 30 seconds
Slow/Chronic Situations: Evaluated every minute.

Alarm Latching: Alarms set to latch. High and Fail. Reset available only after alarm condition is cleared.

Alarm Status Record: Recorded by the Datalogger and available in real time through computer interface.



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SENSITIVITY / RANGE:

Accuracy: ±20% or better.

Sensitivity: Measures below 57 KeV and discriminates above 57 KeV.

Specifically the MCA assigns a narrow “area of interest” to the I-125 peak. Automatic spectrum tracking keeps / maintains Iodine peak within this window over time. Use of peak identification and a narrow window results in low background count and excellent MDA / sensitivity.

Response: Can measure 1 DAC over 8 hour period or 0.02 DAC over a 40 hour period.

Range / Span: 0 to 10 DAC or 0 to 2.0×10^{-7} $\mu\text{Ci}/\text{cm}^3$.

Background Compensation:

Gamma background compensation is effective up to at least 3 mR/h.

AIR FLOW:

Pump: Muffler and trap included. Low noise <60 dB.

Flow Rate: Regulated and Adjustable. User settable airflow up to a maximum 170 lpm.

Flow Control: Manual.

Filters: 10 (ten) Silver Activated Charcoal filter cartridges (Model CF-1) included.
OPTIONAL for Particulates Only: Membrane, paper, or glass fiber filters can be used.

Filter Change / Dust Loading

FM-9-MCA-2 can operate continuously for one month in most facilities without excessive dust loading (under normal facility airborne dust concentration conditions). Filters can be changed monthly, but for best accuracy, weekly change is suggested.

Line Construction: One inch to half inch stainless steel tubing, good for Swagelok fitting.

Ambient Influences:

- **Temp:** 0-40° C
- **Humidity:** 20-85% RH Non-Condensing
- **Pressure:** Ambient / Atmospheric

CASE:

- Electronics housed in enameled metal case; carrying handles optional.
- Protected against falling dirt or other such pollution. IP-20.

Mounting: Cart mounted with lockable wheels;
separate external alarm light, area of visibility - 360 degrees.

Dimensions: 860 mm wide, 1150 mm high – Total.

POWER:

Power: 120V, 50-60 Hz ±10% (230 V optional).

Power Connection: User specified – NEMA-1-15P or NEMA5-15P).

Power Protection: Protected against voltage and frequency fluctuations.)

Power Cord: 5 meters long.



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WEIGHT:

ITEM	WEIGHT
FM-9 Electronics Modules	20 pounds
Pump	8 pounds
Detector Shield (1" Pb equivalent) with Detector	45 pounds
Cart	35 pounds
Monitor	4 pounds
Paperless Chart Recorder	6 pounds



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